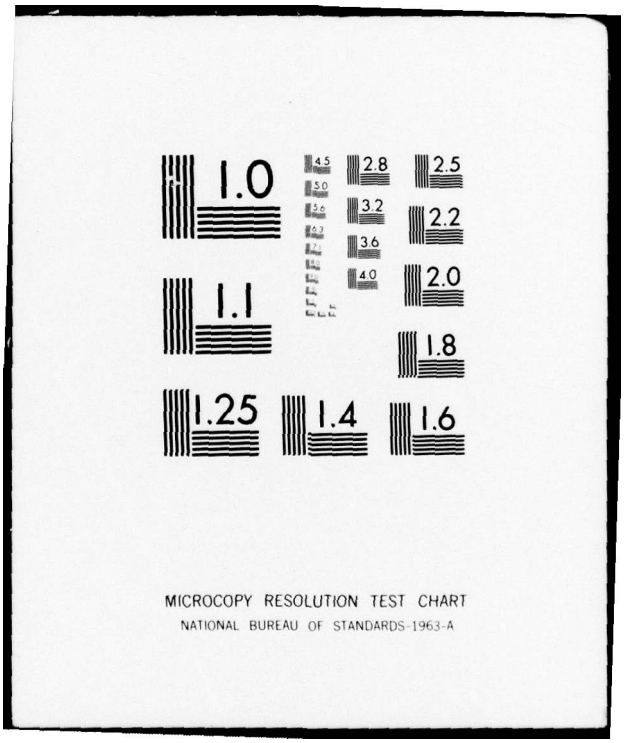
AD-A039 077 FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO F/G 9/5
MICROWAVE TUBE ANTENNA ENABLING WORK IN THREE FREQUENCY BANDS,(U)
NOV 76 J DOBOSZ, E PIETRASZEWSKI, W SLOWIECKI

UNCLASSIFIED FTD-ID(RS)I-1393-76 NL

| OF |
AD A039077

END
DATE FILMED
5-77


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

FTD-ID(RS)I-1393-76

FOREIGN TECHNOLOGY DIVISION

MICROWAVE TUBE ANTENNA ENABLING WORK IN THREE FREQUENCY BANDS

by

J. Dobosz, E. Pietraszewski, W. Slowiecki

EDITED TRANSLATION

FTD-ID(RS)I-1393-76 8 November 1976

FTD-76-C-001144

MICROWAVE TUBE ANTENNA ENABLING WORK IN THREE FREQUENCY BANDS

By: J. Dobosz, E. Pietraszewski, W. Slowiecki

English pages: 4

Source: III Krajowa Konferencja Mecs Zakopane 30 Sept- 3 Oct 1974, Mikrofalowa Elektronika Ciala Stalego, Warsaw, 1974, PP 18-21

Country of origin: POLAND
Translated by: SCITRAN
F33657-76-D-0390
Requester: FTD/ETWE

PREPARED BY:

TRANSLATION DIVISION
FOREIGN TECHNOLOGY DIVISION
WP-AFB, OHIO.

MICROWAVE TUBE ANTENNA ENABLING WORK IN THREE FREQUENCY BANDS

by Jerzy Dobosz, Edward Pietraszewski and Wadim Slowiecki

1. Introduction

Wide-band antennae are currently known from the technological literature. [8] In practice assurance of parameters constancy in a wide band of frequency is not always necessary and an antenna with sufficiently good parameters in only certain bands of work of microwave apparatus is sufficient.

2. Antenna construction [1]

A tube antenna, designed for one band of basic frequency, can be used to work in two other bands, comprising the second and third harmonic of basic frequency, after some structural changes.

In connection with the above we have limited ourselves to investigating three electrical waves in a wave-guide with the break-down presented in Fig.1.b. For the purpose of approximate assurance of a steady phase at the aperture for the third harmonic, which corresponds to the break-down of a wave of type TE_{30}, it is sufficient to extend the tube so that the differences in the electric routes ee'-cc'and ff'-cc' for the harmonic amount to 180^0 (Fig. 1a). A similiar method can guarantee phase stability for the second harmonic [2], but in the antenna under discussion we used a dielectric for this purpose acting partially as a wave-guide, which causes distortion of the wave front [3]. In order for the dielectric [9]

to have an effect, it is primarily directed at the wave of field break-down TE_{20}, and must determine a thin plate placed at the spot where the magnitude of the electrical field of the third harmonic of break-down TE_{30}, amounts to zero, i.e., at a distance one-third away from the wezsca wall of the wave-guide (Fig. la). Obtaining the required distortion of the wave head of the second harmonic, which in effect allows the required phase stability to be obtained, imposes conditions for the magnitude of shift of the phase introduced by the dielectric plate and on its distance from the base of the tubes. Thorough consideration has shown that the phase shift should be about 190^0, and the dielectric plate placed at the base of the tube.

3. Results of measurements

We designed and produced a tube antenna, working in the bands 10cm, 4.5cm and 3cm. The transverse dimensions of the wave-guide were taken as a=72mm, b=10mm, tube length L=90mm, and tube width D=130mm. The radiation characteristics are presented in Fig. 2. The results obtained show the suitability of the tube antenna described for multiband use, particularly as an element illuminating a parabolic antenna.

Literature

1. J. D o b o s z, Zastrzeżenie patentowe, Wojskowa Akademia Techniczna, Warszawa 1974.
2. J. D o b o s z, E. P i e t r a s z e w s k i, W. S ł o w i c k i, Wielopasmowa niesymetryczna antena tubowa, Biuletyn WAT /praca w druku/.
3. R.E. C o l l i n, Prowadzenie fal elektromagnetycznych, WNT, Warszawa 1966.

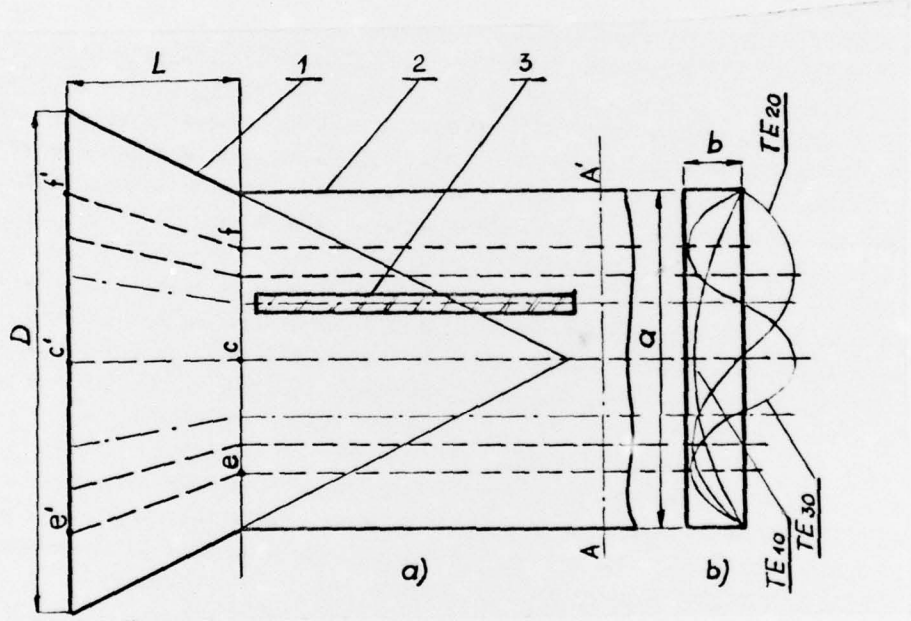


Fig. 1a. Construction of a three-band tube antenna: 1-tube, 2-wave-guide, 3-phase shifter; b(break-down of the tension of the electrical field at level AA'

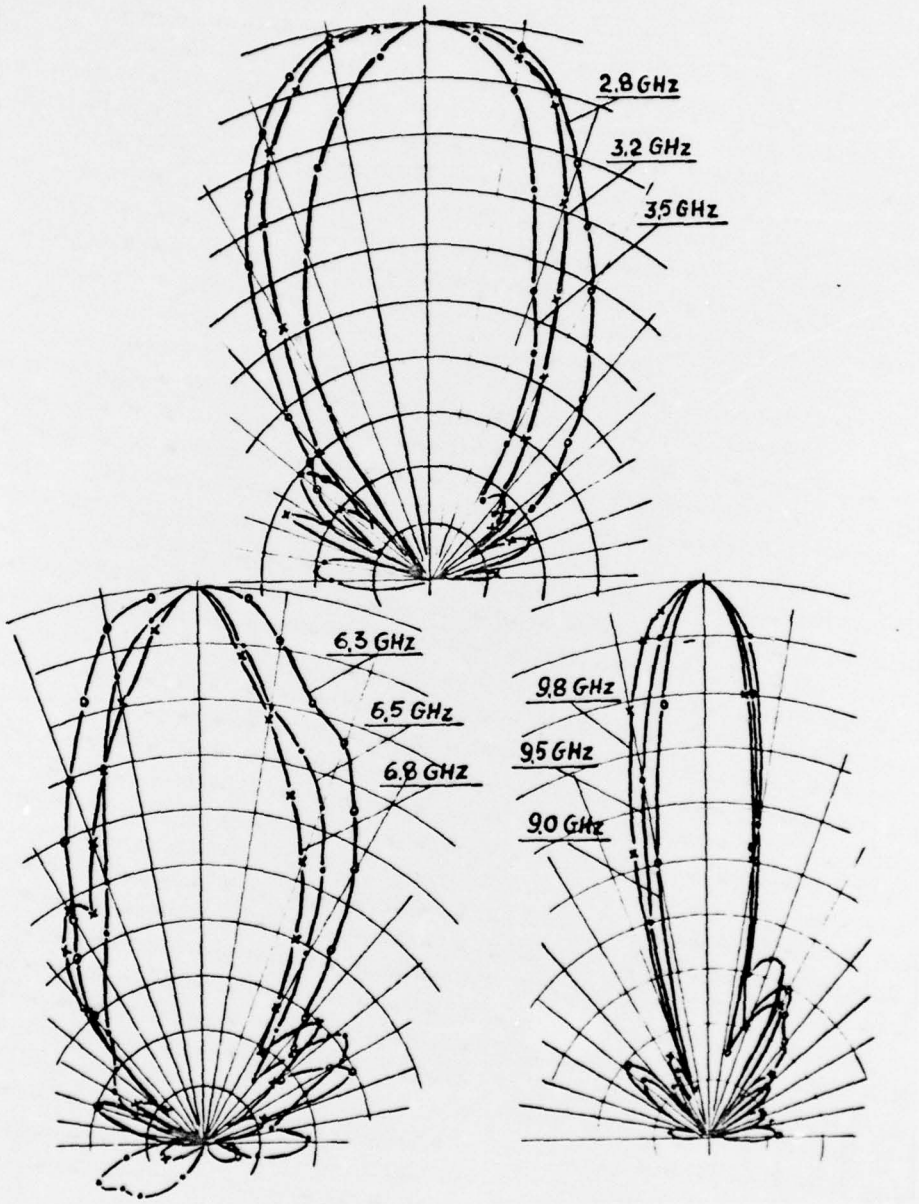


Fig. 2. Characteristics of antenna radiation

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER FTD-ID(RS)I-1393-76	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* MICROWAVE TUBE ANTENNA ENABLING WORK IN THREE FREQUENCY BANDS		5. TYPE OF REPORT & PERIOD COVERED Translation 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) J. Dobosz, E. Pietraszewski, W. Slowiecki		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Foreign Technology Division Air Force Systems Command U. S. Air Force		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE 1974 13. NUMBER OF PAGES 4
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

09

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

DISTRIBUTION LIST

DISTRIBUTION DIRECT TO RECIPIENT

ORGANIZATION		MICROFICHE
A205	DMATC	1
A210	DMAAC	2
B344	DIA/DS-4C	8
C043	USAMIIA	1
C509	BALLISTIC RES LABS	1
C510	AIR MOBILITY R&D LAB/FIO	1
C513	PICATINNY ARSENAL	1
C535	AVIATION SYS COMD	1
C557	USAIIC	1
C591	FSTC	5
C619	MIA REDSTONE	1
D008	NISC	1
H300	USAICE (USAREUR)	1
P005	ERDA	2
P055	CIA/CRS/ADD/SD	1
NAVORDSTA (50L)		1
NAVWPNSCEN (Code 121)		1
NASA/KSI		1
544 IES/RDPO		1
AFIT/LD		1

ORGANIZATION		MICROFICHE
E053	AF/INAKA	1
E017	AF/RDQLR-W	1
E404	AEDC	1
E408	AFWL	1
E410	ADTC	1
E413	ESD	2
	FTD	
	CCN	1
	ETID	3
	NIA/PHS	1
	NICD	5